

Externalizing and Internalizing Subtypes of Combat-Related PTSD: A Replication and Extension Using the PSY-5 Scales

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This study replicated and extended prior findings of internalizing and externalizing subtypes of posttraumatic response (M. W. Miller, J. L. Greif, & A. A. Smith, 2003). Cluster analyses of the Minnesota Multiphasic Personality Inventory—2 Personality Psychopathology—Five (MMPI-2 PSY-5; A. R. Harkness, J. L. McNulty, Y. S. Ben-Porath, 1995) profiles obtained from 736 veterans with posttraumatic stress disorder (PTSD) partitioned the sample into a low pathology cluster defined by personality scores in the normal range, an externalizing cluster characterized by low constraint and high negative emotionality, and an internalizing cluster with high negative emotionality and low positive emotionality. Externalizers showed the highest rates of alcohol-related and antisocial personality disorders; internalizers, the highest rates of panic and major depressive disorder. These findings support the development of a personality-based typology of posttraumatic response designed to account for heterogeneity in the expression of PTSD and associated psychopathology.

Research on the structure and organization of mental disorders suggests that patterns of behavioral disturbance and psychiatric comorbidity tend to cohere along the dimensions of externalization and internalization. This taxonomy was derived from a tradition of research in the area of childhood behavior disorders (cf. Achenbach & Edelbrock, 1978, 1984) and advanced by recent factor-analytic studies of the latent structure of adult mental illness (Cox, Clara, & Enns, 2002; Kendler, Prescott, Myers, & Neale, 2003; Krueger, Caspi, Moffitt, & Silva, 1998; Krueger, McGue, & Iacono, 2001). In a series of recent studies, Krueger and colleagues reported that patterns of comorbidity tend to cohere along these dimensions with the alcohol and substance-related disorders and antisocial personality disorder loading on the externalizing dimension and the unipolar mood and anxiety disorders falling on the internalizing dimension. These axes are believed to reflect core personality processes that influence the form and expression of psychopathology. Numerous studies suggest that the primary personality substrate for the internalizing disorders is high negative emotionality, with low positive emotionality contributing to a lesser extent (Clark & Watson, 1991; Clark, Watson, & Mineka, 1994; Krueger, Caspi, Moffitt, Silva, & McGee, 1996; Krueger et

al., 2001; Watson & Clark, 1984). On the other hand, low constraint or impulsivity has been implicated as the primary substrate for the externalizing disorders (Krueger et al., 2001; Schwartz, Snidman, & Kagan, 1996).

The objective of this study was to apply this two-dimensional model to understand the heterogeneity of psychopathology and patterns of comorbidity observed in association with the specific syndrome of posttraumatic stress disorder (PTSD). The central hypothesis was that the form and expression of PTSD is influenced by individual differences in tendencies toward the externalization versus the internalization of distress as manifested by subtypes of PTSD differing on these dimensions (cf. Miller, 2003). To test this hypothesis, we conducted a replication and extension of a recent study in which we found preliminary evidence of internalizing and externalizing subtypes of posttraumatic response (Miller et al., 2003).

In the prior study, cluster analyses performed on the Multidimensional Personality Questionnaire (MPQ; Tellegen, in press) profiles of 237 male veterans with traumatic combat exposure revealed evidence of subgroups that differed on personality dimensions linked to externalizing and internalizing. The *externalizing* cluster was defined by low scores on Constraint, along with elevated scores on Alienation and Aggression. Individuals in this cluster were the most likely to (a) have a substance-related disorder diagnosis, (b) produce elevated scores on the Minnesota Multiphasic Personality Inventory—2 (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1990) Hypomania scale, and (c) have a history of delinquency prior to joining the military. In contrast, the MPQ profile of the *internalizing* cluster was characterized by high Negative Emotionality combined with low Positive Emotionality and, compared with the externalizers, these individuals scored higher on Constraint and lower on Alienation and Aggression. Internalizers had the highest rates of unipolar depressive disorder, and their MMPI-2 clinical scale profiles were defined by elevations on Depression and Social Introversion. Externalizers and internalizers exhibited equivalent PTSD severity and

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Global Assessment of Functioning (GAF; American Psychiatric Association, 1994) scores. A third low-pathology cluster was characterized by MPQ scale scores falling at or near the standardization sample mean along with lower levels of psychiatric impairment across multiple indices of psychosocial functioning. The three groups showed no significant differences on a measure of combat exposure.

These findings represented a first step toward the development of a typology of PTSD designed to account for the heterogeneity of posttraumatic symptomatology and comorbid psychopathology, and the present study was undertaken in an effort to replicate and extend these initial findings. Data for this study were drawn from a sample of male Vietnam veterans who participated in a Department of Veterans Affairs (DVA) multisite cooperative study on the psychophysiological assessment of PTSD (Keane et al., 1998). We assessed PTSD and other Axis I and Axis II disorders with the *Structured Clinical Interview for DSM-III-R* (SCID; Spitzer, Williams, Gibbon, & First, 1989). We also administered the MMPI-2 along with an extensive battery of other interview and self-report measures to evaluate relevant personality, mental health, and psychosocial history variables. Because the MPQ, on which the first study (Miller et al., 2003) was based, was not among these measures, we used the Personality Psychopathology—Five scales (PSY-5; Harkness, McNulty, & Ben-Porath, 1995; Harkness, McNulty, Ben-Porath, & Graham, 2002) for the MMPI-2 to index personality dimensions. The PSY-5 was well suited for this purpose because it includes scales that correspond to the MPQ's higher order factors Positive Emotionality, Negative Emotionality, and Constraint; it also includes scales measuring Aggressiveness and Psychoticism. Harkness et al. (1995) reported correlations between the MPQ and PSY-5 Positive Emotionality, Negative Emotionality, and Constraint scales of .62, .72, and .57, respectively, suggesting good convergence between the two inventories.

Study Hypotheses

1. We expected cluster analyses of the PSY-5 scales to partition individuals with PTSD into subgroups with equivalent levels of combat exposure but different levels of psychopathology and propensities toward the externalization versus internalization of distress. Specifically, following Miller et al. (2003), we expected to find (a) a low-pathology cluster defined by PSY-5 scale scores at or near the normative mean and relatively low levels of PTSD severity, (b) an externalizing cluster defined by high Negative Emotionality combined with high Aggressiveness and low Constraint, and (c) an internalizing cluster characterized by high Negative Emotionality combined with low Positive Emotionality. On the basis of the results of the first study, we expected the latter two groups to exhibit comparable levels of PTSD severity.
2. We expected patterns of comorbid diagnosis and other relevant psychopathological indicators to covary with these clusters as evidenced by (a) low levels of comorbid diagnosis in the low-pathology group, (b) high rates of comorbid antisocial personality disorder and alcohol and substance-related disorders and associated indicators (i.e., positive urine toxicology screen) in the externaliz-

ing group, and (c) high rates of comorbid anxiety and depressive disorders and associated problems (e.g., history of suicide) in the internalizing group.

Method

Participants

Participants were male military veterans currently using services of the DVA who served in the Vietnam theater of operations between August 1964 and May 1975 as confirmed by inspection of appropriate records (e.g., DD-214 military discharge papers). Recruitment took place over a 42-month interval between 1989 and 1992 from inpatient and outpatient programs at 15 DVA medical centers across the United States. Because the focus of the original study was on the psychophysiological assessment of PTSD, individuals were excluded from participation if they were taking medications that might significantly alter their psychophysiological responding (specifically, if they were taking beta blockers or had angina, uncontrolled hypertension, cardiovascular disease, history of myocardial infarction, seizure disorder, or endocrine disorder). Individuals were also excluded if they were already involved in other research sponsored by the Veterans Affairs Cooperative Studies Program.

We screened 2,115 individuals for the study. Of these individuals, 1,461 qualified for eligibility and 1,328 underwent diagnostic interviews. Analyses for this study were based on data for all participants who completed the MMPI-2 and qualified for a current diagnosis of PTSD secondary to combat in Vietnam ($n = 736$). The mean age of this subsample was 43 years ($SD = 3.1$; range = 36–71). The racial breakdown was 65% White, 19% Black, 11% Hispanic, 3% American Indian/Alaskan Native, and 1% Asian/Pacific Islander. Of the veterans, 62% were in the Army, 28% were in the Marines, 4% were in the Air Force, and 6% were in the Navy. PTSD diagnoses were based on diagnostic criteria specified in the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; DSM-III-R; American Psychiatric Association, 1987) and derived via administration of the SCID PTSD module. Other details of the sample and assessment can be found in Keane et al. (1998).

Measures

Axis I and Axis II diagnoses. Modules of the SCID I and SCID II interviews were administered to assess current diagnoses of PTSD, panic disorder, obsessive-compulsive disorder, major depressive disorder, alcohol-related disorder, substance-related disorder, and antisocial personality disorder. All diagnostic interviews were audiotaped. Interrater reliability was assessed via review of 128 of the audiotapes by a second clinician and reassessment of 36 participants by a second clinician. Kappa, computed with the combined results of the two approaches, was .65 for the current PTSD diagnosis and ranged from .43 to .67 for other current diagnoses. Disorders that were excluded from analysis were those that either had current rates of less than 4% in the sample (bipolar disorder, schizophrenia, somatoform disorder, and dissociative disorder), or kappa's less than .40 (borderline personality disorder, non-combat-related PTSD, and social phobia).

Combat Exposure Scale (CES; Keane et al., 1989). The 7-item CES measures the intensity, frequency, and duration of exposure to combat-related experiences involving death, injury, or danger. Keane et al. reported internal consistency (alpha) and 1 week test-retest reliability coefficients of .85 and .97, respectively, and positive associations between the CES and measures of PTSD. Data were missing for 4% of the sample.

GAF. Participants were assigned a GAF score by doctoral-level clinicians reflecting their overall level of functioning at the time of the assessment. A subset of 31 participants was evaluated independently by two clinicians. The intraclass correlation between their ratings (computed with

a one-way random effects model) was .62. GAF scores were missing for 13% of the sample.

History of attempted suicide. History of attempted suicide was assessed with the question "Have you ever attempted suicide?" to which participants responded with a "yes" or "no" answer. This question was embedded in a longer interview about war zone experiences and psychiatric history (The War Stress Interview; Rosenheck & Fontana, 1989).

MMPI-2. All participants completed the MMPI-2. Following the recommendations of Arbisi and Ben-Porath (1995) and replicating procedures that were used in the previous study, profiles with validity indices exceeding the following criteria were identified as invalid [per the F(p), VRIN, and TRIN MMPI-2 validity scales]: $F > 100$ and $F(p) > 80$, or $VRIN > 80$, or $TRIN > 100$ (all T scores). Application of this rule resulted in the exclusion of 18% of the sample, leaving 603 cases for further analysis. We performed cluster analyses on cases with valid MMPI-2 profiles using the PSY-5 scales that showed the following Cronbach alphas: Positive Emotionality = .85; Negative Emotionality = .85; Constraint = .65; Aggressiveness = .67; Psychoticism = .82.

Additional data analyses focused on the 10 MMPI-2 clinical scales along with 17 content and supplementary scales that we judged to be relevant to internalizing and externalizing psychopathology. The internalizing set included the Anxiety, Depression, Fears, Health Concerns, Low Self-Esteem, Obsessiveness, Social Discomfort, Welsh Anxiety, and Welsh Repression Scales. The externalizing set included the Addiction Potential, Addiction Admission, Anger, Antisocial Practices, Cynicism, MacAndrew Alcoholism, Social Responsibility, and Type-A Personality Scales.

Mississippi Scale—Military version (Keane, Caddell, & Taylor, 1988). The military version of the Mississippi Scale is a 35-item self-report measure examining severity of combat-related PTSD and has been found to correlate highly with assessments of PTSD severity derived from structured clinical interviews. The original validation study reported a Cronbach alpha of .94 and test-retest reliability of .97 over a 1-week interval. Alpha for the current sample was .90. Evidence for the convergent and discriminant validity of the Mississippi Scale for the assessment of combat-related PTSD is extensive (e.g., Keane et al., 1988; McFall, Smith, Mackay, & Tarver, 1990; King & King, 1994). Data were missing for 4% of the sample.

Premilitary Delinquency Scale. A Premilitary Delinquency Scale was constructed from 10 items taken from the preservice background section of the War Stress Interview that was developed by Rosenheck and Fontana, (1989) for their studies. The following items were referenced to behavior prior to age 15:

1. "Were you ever arrested or sent to juvenile court?"
2. "Did you run away from home and stay out overnight more than once?"
3. "Did you lie a lot?"
4. "Did you often drink or use drugs?"
5. "Did you often steal things?"
6. "Did you often deliberately damage things that weren't yours?"
7. "Did you often start fist fights?"

The following three additional items were referenced to behaviors prior to age 18:

8. "Did you have any friends who got into trouble with the law or school authorities?"

9. "Did you yourself get into trouble with the law or school officials?"

10. "Did you play hookey frequently?"

Dichotomous ("yes" or "no") responses were summed to create a continuous score intended to reflect the severity of premilitary delinquent behavior. Cronbach alpha for the scale was .78. Data were missing for 4% of the sample. No comparable items were available in the data set to construct a similar scale measuring premilitary internalizing behavior.

Urine toxicology. Urine toxicology data was available for 559 participants with a valid MMPI-2 profile. The assay tested for the presence of methadone, opiates, cocaine, propoxyphene (Darvon), barbiturates, benzodiazepine, cannabis, and amphetamine. Results from individual assays were transformed into a single composite dichotomous measure representing the presence or absence of any of the eight compounds.

Cluster Analyses

We performed a K-means analysis of the MMPI-2 PSY-5 scales with a priori specification of three clusters to examine the replicability of the previous findings. K-means is an iterative partitioning approach that seeks to identify similarities among individuals on variables included in the analysis and partitions the sample into a specified number of subgroups according to those similarities. We used raw PSY-5 scores in the cluster analysis, but findings are presented in T scores based on published norms (Harkness et al., 2002) to facilitate between scale comparisons and interpretation of results.

Analyses examining differences between PSY-5 clusters. Differences between clusters were tested with parametric analyses of variance (ANOVAs) for continuous variables and nonparametric (Kruskal-Wallis) ANOVAs for categorical variables. Familywise error was controlled through Bonferroni corrections based on the number of comparisons within each set of variables as defined below. We performed post hoc comparisons with Tukey HSD (parametric) and Mann-Whitney (nonparametric) tests with alpha set at .05.

Results

MMPI-2 Results

PSY-5 scales. The K-means analysis performed on the MMPI-2 PSY-5 scales resulted in assignment of 187 (31%) cases to Cluster 1, 167 (28%) cases to Cluster 2, and 249 (41%) cases to Cluster 3. Mean scores for these scales are listed by cluster in Table 1. One-way ANOVAs (adjusted $\alpha = .01$) revealed significant group differences on all five scales. Individuals in Cluster 1 (low-pathology group) produced relatively low scores on the Aggression, Psychoticism, and Negative Emotionality scales along with high scores on the Constraint and Positive Emotionality scales, compared with those in the other two clusters. In contrast, Clusters 2 and 3 tended to deviate from Cluster 1 in pathological directions, with the former producing a pattern suggestive of an externalizing profile and the latter producing an internalizing one. Specifically, the externalizing group was characterized by significantly higher aggression and psychoticism and lower constraint than the other two groups. In contrast, the internalizing group produced the lowest scores on Positive Emotionality and, compared with the externalizers, scored lower on Aggressiveness and Psychoticism and higher on Constraint.

Clinical scales. Mean scores for the MMPI-2 clinical scales are also listed by cluster in Table 1. One-way ANOVAs (adjusted $\alpha = .005$) revealed that the low-pathology group produced signif-

Table 1
PSY-5 Factor Scores and MMPI-2 Clinical Scales by Cluster

Measure	Cluster			F	Pairwise contrast	Cluster 2 vs. 3 effect size (<i>d</i>)
	Low pathology (1)	Externalizer (2)	Internalizer (3)			
PSY-5 (T score)						
PEM	66.8 (11.7)	64.3 (10.1)	44.4 (6.9)	370.0	1 > 2 > 3	2.3
NEM	57.2 (8.0)	76.3 (6.9)	75.8 (7.9)	388.3	2 & 3 > 1	<i>ns</i>
Constraint	50.3 (9.7)	43.3 (8.2)	51.9 (10.2)	43.5	1 & 3 > 2	0.9
Aggressiveness	54.8 (11.0)	69.1 (11.2)	55.5 (10.9)	97.0	2 > 1 & 3	1.2
Psychoticism	54.2 (10.1)	78.3 (12.2)	69.0 (13.3)	181.2	2 > 3 > 1	0.7
MMPI-2 clinical scale (T score)						
Hypochondriasis	64.1 (13.7)	80.5 (15.9)	83.8 (16.8)	90.7	2 & 3 > 1	<i>ns</i>
Depression	65.9 (13.7)	74.5 (11.8)	88.8 (9.9)	213.3	3 > 2 > 1	1.3
Hysteria	60.7 (12.9)	63.1 (12.7)	69.7 (12.2)	30.0	3 > 1 & 2	0.5
Psychopathic Deviate	65.1 (11.2)	79.1 (9.9)	80.5 (8.8)	145.3	2 & 3 > 1	<i>ns</i>
Masculinity/Femininity	51.6 (9.1)	51.3 (8.2)	52.3 (8.5)	<i>ns</i>	<i>ns</i>	<i>ns</i>
Paranoia	62.6 (12.7)	78.3 (12.6)	76.9 (14.4)	79.5	2 & 3 > 1	<i>ns</i>
Psychasthenia	61.8 (10.8)	80.7 (9.5)	84.7 (9.6)	302.9	3 > 2 > 1	0.4
Schizophrenia	64.9 (12.8)	88.1 (13.1)	90.7 (13.2)	233.6	2 & 3 > 1	<i>ns</i>
Hypomania	55.1 (9.4)	69.2 (9.6)	59.0 (9.1)	107.4	2 > 3 > 1	1.1
Social Introversion	55.8 (9.7)	65.3 (9.4)	75.7 (8.2)	261.6	3 > 2 > 1	1.2

Note. Total *n* for each cluster is as follows: Low pathology = 187; Externalizers = 167; Internalizers = 249. Table lists group means with standard deviations in parentheses. Bold font highlights salient features of the pattern of results. PSY-5 = Personality Psychopathology—Five scales; MMPI-2 = Minnesota Multiphasic Personality Inventory—2; PEM = Positive Emotionality; NEM = Negative Emotionality. All *F* ratios are significant at *p* < .000.

icantly lower scores than did the other two clusters on every scale except Hysteria. On that scale, low-pathology individuals scored significantly lower than did internalizers, but were equivalent to externalizers. Internalizing versus externalizing group differences were observed on several scales with internalizers scoring higher than externalizers on Depression, Hysteria, Psychasthenia, and Social Introversion. Externalizers exceeded internalizers on Hypomania.

Content and supplementary scales. Mean scores for the content and supplementary scales are listed by cluster in Table 2. One-way ANOVAs (adjusted α = .002) revealed that the low-pathology cluster produced less pathological scores on most of the content and supplementary scales compared with the other two clusters. Exceptions to this were observed for the MacAndrew Alcoholism—Revised (MAC-R) Alcoholism and Addiction Potential scales on which the low-pathology and internalizing groups

Table 2
Select MMPI-2 Content and Supplementary Scales by Cluster

Scale	Cluster			F	Pairwise contrast	Cluster 2 vs. 3 effect size (<i>d</i>)
	Low pathology (1)	Externalizer (2)	Internalizer (3)			
Anxiety	62.5 (10.7)	79.9 (8.0)	81.7 (7.4)	291.3	3 & 2 > 1	ns
Fears	53.2 (10.4)	59.5 (12.6)	61.6 (12.9)	26.9	3 & 2 > 1	ns
Obsessiveness	53.4 (10.5)	69.4 (9.4)	69.7 (10.0)	168.9	3 & 2 > 1	ns
Depression	66.4 (13.3)	84.9 (10.5)	92.4 (10.0)	289.5	3 > 2 > 1	0.7
Health Concerns	61.8 (13.7)	80.5 (17.9)	80.8 (18.6)	79.6	3 & 2 > 1	ns
Anger	59.0 (10.1)	74.0 (6.2)	71.6 (7.4)	186.9	2 > 3 > 1	0.4
Cynicism	53.7 (9.7)	67.0 (6.0)	63.6 (7.6)	138.9	2 > 3 > 1	0.5
Antisocial Practices	53.3 (9.9)	66.6 (8.1)	60.1 (9.3)	93.0	2 > 3 > 1	0.7
Type-A Personality	52.0 (9.5)	66.7 (7.2)	61.7 (7.9)	148.5	2 > 3 > 1	0.7
Low Self-Esteem	55.4 (10.0)	67.8 (10.8)	74.9 (12.3)	161.9	3 > 2 > 1	0.6
Social Discomfort	58.3 (11.7)	64.4 (11.3)	75.3 (6.9)	167.3	3 > 2 > 1	1.2
Welsh Anxiety	58.8 (9.8)	76.4 (7.7)	78.2 (7.7)	320.3	2 & 3 > 1	ns
Welsh Repression	51.8 (9.4)	45.1 (7.8)	56.7 (8.9)	87.0	3 > 1 > 2	1.4
MAC-R Alcoholism	55.5 (10.4)	67.3 (9.2)	57.2 (9.4)	78.0	2 > 1 & 3	1.1
Addiction Potential	53.8 (11.2)	60.5 (9.5)	54.5 (9.6)	23.9	2 > 1 & 3	0.6
Addiction Admission	58.3 (11.8)	70.6 (11.6)	65.4 (12.3)	47.0	2 > 3 > 1	0.4
Social Responsibility	44.0 (8.6)	34.2 (5.9)	39.1 (7.6)	74.7	1 > 3 > 2	0.7

Note. Table lists group means with standard deviations in parentheses. All scales were examined with linear T scores. All *F* values were significant at *p* < .001. Pairwise contrasts were significant at *p* < .008. Bold font highlights salient features of the pattern of results. MMPI-2 = Minnesota Multiphasic Personality Inventory—2; MAC-R = MacAndrew Alcoholism—Revised Alcoholism and Addiction Potential scales.

showed equivalent scores. In addition, on the Welsh Repression Scale, the low-pathology group produced scores that fell between the scores of the other two groups. Differences between the two high-pathology clusters were observed on a number of scales with internalizers scoring higher than externalizers on Depression, Low Self-Esteem, Social Discomfort, Welsh Repression, and Social Responsibility. Externalizers, on the other hand, scored higher than did internalizers on the Anger, Cynicism, Antisocial Practices, Type-A Personality, and all three addiction-related scales.

Comorbid Disorders

Table 3 lists the prevalence of current comorbid disorders for each cluster. The low-pathology group showed lower rates of comorbid major depression and alcohol-related disorder than did the other two clusters. Internalizers had higher rates of comorbid panic disorder and major depression compared with the other two clusters. Externalizers, in contrast, showed higher rates of comorbid alcohol-related disorder and antisocial personality disorder than did individuals in the other two clusters. Externalizers also showed higher rates of current substance-related disorder than did those in the low-pathology group ($Z = 1.81, p < .04$, one-tailed) and the internalizing group ($Z = 2.31, p < .02$, one-tailed), although results of the overall chi-square analysis, $\chi^2(2, N = 603) = 6.1, p < .05$, failed to achieve statistical significance ($\alpha = .008$) after controlling for familywise error.

Measures of Combat Exposure, Current Functioning, PTSD, Suicide Attempts, Premilitary Delinquency, and Urine Toxicology by Cluster

Table 4 lists group means on measures of combat exposure, current functioning, PTSD, premilitary delinquency, and the percentage of participants in each group who endorsed a history of suicide or produced a positive urine toxicology screen. Individuals in the three clusters produced equivalent scores on the CES and reported serving for an equal number of months in Vietnam, but they differed significantly from each other on measures of PTSD severity with the low-pathology, externalizing, and internalizing clusters showing lowest, intermediate, and highest scores on the

SCID (total PTSD symptom count), the Mississippi Scale, and the Keane Posttraumatic Stress Disorder subscale of the MMPI-2 (PK; Keane, Malloy, & Fairbank, 1984), respectively. Examination of counts of individual PTSD symptoms by symptom cluster (i.e., reexperiencing, avoidance/numbing, hyperarousal) showed the same general pattern, with the exception that there was no significant difference between the externalizers and internalizers on the number of hyperarousal symptoms endorsed. The low-pathology group received higher GAF scores than did the other two groups. The externalizing group produced the highest scores on the Premilitary Delinquency Scale, and individuals in this group were the most likely to produce positive results on the urine toxicology screen. Finally, internalizers were more likely than those in the other two groups to endorse a history of a suicide attempt.

Demographic Characteristics

Table 5 lists the results for demographic variables by cluster. Analyses showed no significant group differences in age or years of postmilitary education. High rates of unemployment were observed across groups, but the low-pathology group reported the lowest levels of unemployment and the highest annual income of the three. Internalizers reported the least education prior to joining the military and were the most likely to have a service-connected PTSD disability and to be unemployed. Externalizers, on the other hand, were the least likely to be currently married without ever having been divorced.

Analyses With PTSD Severity Included as a Covariate

The finding that the three clusters differed significantly from one another on measures of PTSD severity raised questions about whether group differences simply reflect quantitative differences in the severity of psychopathology, rather than qualitative differences indicative of subtypes. To address this issue, we performed a series of analyses of covariance on all continuous measures in Tables 1-3 and on the non-PTSD specific measures in Table 4 with PTSD severity indexed by the Mississippi Scale, entered as the covariate. We examined dichotomous dependent variables with

Table 3
Current SCID Diagnoses by Cluster

Disorder	Clusters			Overall	χ^2	Pairwise contrast	Cluster 2 vs. 3 effect size (d)
	Low pathology (1)	Externalizer (2)	Internalizer (3)				
Panic	7.5	9.0	17.3	11.9	11.6	3 > 1 & 2	0.2
Obsessive-Compulsive	3.2	8.4	6.4	6.0	<i>ns</i>	<i>ns</i>	<i>ns</i>
Major depressive	23.5	34.1	43.4	34.7	18.6	3 > 2 > 1*	0.2
Alcohol-related	13.9	29.9	22.1	21.7	13.4	2 > 3 > 1	0.2
Substance-related	10.7	17.4	9.6	12.1	6.1*	2 > 1 & 3	0.2
Antisocial personality	7.0	19.8	10.4	11.9	14.6	2 > 1 & 3	0.3

Note. Table lists the prevalence of each disorder by cluster in percentages along with the overall base rate for each disorder and significant Pearson chi-square statistics and pairwise comparisons. Unless otherwise noted, all chi-square values were significant at the $p < .008$ level. Pairwise contrasts were all significant at $p < .05$ (one-tailed). Bold font highlights salient features of the pattern of results. SCID = Structured Clinical Interview for DSM-III-R (Spitzer, Williams, Gibbon, & First, 1989).

* Denotes contrasts between the externalizing and internalizing clusters that failed to achieve significance after controlling for posttraumatic stress disorder severity.

* $p < .05$.

Table 4

Combat Exposure, Current Functioning, Posttraumatic Stress Disorder (PTSD), Suicide Attempts, and Premilitary Delinquency by Cluster

Measure and variable	Cluster			F	Pairwise contrast	Cluster 2 vs. 3 effect size (d)
	Low pathology (1)	Externalizer (2)	Internalizer (3)			
CES	28.1 (9.1)	29.6 (7.8)	28.5 (8.6)	<i>ns</i>	<i>ns</i>	<i>ns</i>
GAF	57.1 (11.4)	51.7 (9.6)	50.7 (9.6)	19.6	1 > 2 & 3	<i>ns</i>
MISS (total)	107.9 (17.4)	122.1 (13.8)	129.2 (14.7)	99.6	3 > 2 > 1	0.5
Months of service in Vietnam	13.7 (6.5)	14.6 (8.8)	13.7 (13.7)	<i>ns</i>	<i>ns</i>	<i>ns</i>
MMPI-2 PK	67.5 (11.6)	89.7 (10.0)	93.8 (9.6)	370.7	3 > 2 > 1	0.4
Premilitary delinquency	2.1 (2.1)	3.0 (2.4)	1.9 (2.0)	12.5	2 > 1 & 3	0.5
SCID PTSD						
Total symptoms	10.6 (2.7)	12.0 (2.8)	12.8 (2.9)	34.5	3 > 2 > 1	0.3
Reexperiencing Sxs	2.3 (1.1)	2.5 (1.1)	2.8 (1.1)	12.9	3 > 1 & 2	0.3
Avoidance and Numbing Sxs	4.4 (1.3)	4.9 (1.4)	5.2 (1.4)	20.9	3 > 2 > 1	0.2
Hyperarousal Sxs	3.9 (1.4)	4.6 (1.3)	4.8 (1.2)	27.3	2 & 3 > 1	<i>ns</i>
History of suicide attempt % ^b	27.7	33.7	45.3		3 > 1 & 2 ^a	0.2
Positive urine screen % ^b	7.6	15.5	8.6		2 > 1 & 3	0.2

Note. Table lists group means with standard deviations in parentheses along with significant one-way analysis of variance *F* statistics and pairwise comparisons. Unless otherwise noted, all *F* values were significant at $p < .001$. All pairwise contrasts were significant at $p < .05$. Bold font highlights salient features of the pattern of results. Blank cells indicate that data were not applicable. CES = Combat Exposure Scale; GAF = Global Assessment of Functioning; MISS = Mississippi Scale; MMPI-2 PK = Minnesota Multiphasic Personality Inventory-2 Keane's Posttraumatic Stress Disorder subscale; SCID PTSD = Structured Clinical Interview for PTSD; Sxs = Symptoms.

^a Denotes contrasts between the externalizing and internalizing clusters that failed to achieve significance after controlling for PTSD severity. ^b $\chi^2 = 14.6$ and 6.7 for history of suicide attempt (%) and positive urine screen (%), respectively.

* $p < .05$.

logistic regression by regressing each dependent variable on cluster group and Mississippi score. Results showed that, although PTSD severity accounted for a significant proportion of the variance in most analyses (primarily reflecting the difference between the low-pathology and two high-pathology groups), the covariate never negated the overall cluster effect. We also reran each pairwise contrast comparing the internalizing and externalizing clusters, again with the Mississippi Scale entered as the covariate, and found that all of the simple effects involving the contrast of these two groups remained significant with the covariate added to the equation, with two exceptions: the differences between internalizers and externalizers on rates of major depressive disorder and

suicide attempts failed to achieve significance after controlling for PTSD severity.

Discussion

The primary objective of this study was to replicate and extend prior evidence of personality-based internalizing and externalizing subtypes of posttraumatic response (Miller et al., 2003). As in the previous study, cluster analyses partitioned this sample of Vietnam veterans with combat-related PTSD into (a) a low-pathology cluster defined by MMPI-2 PSY-5 scale scores falling at or near the normative mean, (b) an externalizing cluster characterized by high

Table 5

Demographic Variables by Cluster

Variable	Cluster			F	Pairwise contrast	Cluster 2 vs. 3 effect size (d)
	Low pathology (1)	Externalizer (2)	Internalizer (3)			
Age	43.3 (3.0)	43.4 (3.9)	43.1 (2.7)	<i>ns</i>	<i>ns</i>	<i>ns</i>
Annual income (dollars)	15,928 (14,149)	12,568 (13,935)	12,651 (12,722)	3.86 ^a	1 > 2 & 3	<i>ns</i>
% with VA PTSD disability ^b	18.8	17.2	34.2		3 > 1 & 2	0.4
% Unemployed ^b	28.6	43.3	59.5		1 > 2 > 3	0.2
% Married and never divorced ^b	26.0	13.7	19.9		1 > 2	0.2
Years of education						
Premilitary	11.8 (1.6)	11.6 (1.6)	11.3 (1.5)	5.71	1 > 3	<i>ns</i>
Postmilitary	2.2 (2.0)	1.9 (1.7)	1.9 (2.0)	<i>ns</i>	<i>ns</i>	<i>ns</i>

Note. Table lists either group means with standard deviations in parentheses or group proportions along with significant one-way analysis of variance *F* statistics or χ^2 statistics and pairwise comparisons. All *F* values were significant at $p < .007$ unless otherwise noted. All pairwise contrasts were significant at $p < .05$. Bold font highlights salient features of the pattern of results. Blank cells indicate that data were not applicable. VA PTSD = Veterans Affairs Posttraumatic Stress Disorder.

^a $p < .02$. ^b $\chi^2 = 19.8, 16.1$, and 8.03 for VA PTSD disability (%), unemployed (%), and married and never divorced (%), respectively.

scores on Negative Emotionality, Psychoticism, and Aggressiveness combined with low Constraint, and (c) an internalizing cluster with high scores on Negative Emotionality combined with low Positive Emotionality. These findings, based on the PSY-5 scales, closely match those obtained with the MPQ in the prior work. Both studies suggest that internalizers and externalizers share a common disposition to experience frequent and intense negative emotions and distress (i.e., high Negative Emotionality) but differ in essential ways with regard to the form and direction in which that distress is expressed. Specifically, the externalizers' low scores on Constraint combined with high Aggression is indicative of tendencies toward impulsive, unsocialized sensation seeking (cf. Zuckerman, 1999) coupled with a propensity for antagonism and offensive action (Harkness et al., 1995). In contrast, internalizers are differentiated primarily in terms of their low Positive Emotionality scores, suggesting the predominance of dispositional anhedonia, introversion, apathy, and inertia.

The MMPI-2 clinical, content, and supplementary scales reinforced and expanded on these characterizations. Externalizers showed the highest scores of the three groups on Hypomania, Anger, Cynicism, Antisocial Practices, Type-A Personality, and all three alcohol and substance-related disorder scales, along with the lowest scores on Social Responsibility. In contrast, internalizers showed the highest scores of the three groups on Depression, Hysteria, Psychasthenia, Social Introversion, Low Self-Esteem, Social Discomfort, and the Welsh Repression Scale.

An unexpected finding was that the externalizers in this sample scored significantly higher than did the other two groups on the PSY-5 Psychoticism scale. The Psychoticism scale was designed to assess psychosis proneness (i.e., perceptual aberration and magical ideation), and it is strongly correlated with the Schizophrenia ($r = .69$) and Paranoia ($r = .65$) clinical scales of the MMPI-2 (Harkness et al., 1995). Given that all participants in this study were interviewed using the psychotic screen of the SCID, and that only 5 out of 163 cases (i.e., 3%) in the externalizing group endorsed any such symptoms, it seems unlikely that elevations on this scale reflected the presence of overt psychotic symptoms. Alternatively, evidence that the Psychoticism scale is moderately correlated with the MPQ Alienation ($r = .61$) and Absorption ($r = .46$) scales (Harkness et al., 1995), coupled with data from the first study, which showed that externalizers scored significantly higher than did the other two groups on these two scales, suggests that the high Psychoticism scores produced by externalizers in this sample may reflect tendencies to perceive the social world as malevolent, to feel betrayed, deceived, exploited and mistreated (Alienation) combined with a capacity to imagine vividly and have episodes of expanded or altered awareness (Absorption).

Current findings also replicated patterns of comorbid diagnosis and psychosocial functioning observed in the first study. The low-pathology group showed less psychiatric comorbidity than the other two groups and had the highest GAF scores, the highest annual income, and the lowest level of unemployment. Externalizers exhibited the highest rates of antisocial personality disorder, the highest scores on a measure of premilitary delinquency, and their tendencies toward antagonistic interactions with others were reflected in their low rates of successful marriage (i.e., they were the least likely to report being married without a history of divorce). Externalizers were also the most likely to receive alcohol-and/or substance-related disorder diagnoses, and the latter was

validated by the observation that these individuals were also the most likely to produce a positive urine toxicology screen. Internalizers, on the other hand, showed the highest rates of panic disorder and major depressive disorder, and they were the most likely to report a history of attempted suicide. In addition, internalizers had the lowest premilitary education, suggesting a lower level of premorbid functioning, and were the most likely to be currently unemployed. Finally, individuals in this group were almost twice as likely to have established military service-connected PTSD disability status than were individuals in the other two groups.

These findings, along with those of the three PTSD measures, suggest that internalizers in this sample exhibited a somewhat more severe and disabling form of PTSD than did the externalizers. This result was also not predicted by the first study, in which these two groups produced equivalent scores on measures of PTSD severity, and the implication of the finding is not entirely clear. It is conceivable that this result reflects an artifact of methodological differences between the two studies, possibly relating to differences in participant characteristics, the data collection context, or measures used in the cluster analysis. Alternatively, the finding of more severe PTSD in the internalizers may reflect a substantive difference in the psychopathological features of the two subtypes and how they relate to the PTSD syndrome as defined by the *DSM*.

Research on the structure of mental illness and patterns of psychiatric comorbidity suggests that PTSD, as currently defined, loads primarily on the internalizing dimension of psychopathology and covaries with the "anxious-misery" disorders (i.e., major depression, dysthymia, and generalized anxiety disorder; Cox et al., 2002). In addition, a recent factor analysis of the symptoms of PTSD found that 8 of the 17 *DSM-IV* symptoms load on a broad dysphoria factor that "shares a strong resemblance to the nonspecific symptoms of many depressive and anxiety disorders" (Simms, Watson, & Doebbeling, 2002, p. 644). Thus, given that the internalizing cluster was defined primarily by their anxious and depressed dispositions, it is perhaps not surprising that this group also exhibited somewhat greater PTSD severity—there is simply greater construct overlap between PTSD and the psychopathology of the internalizing subtype. Empirical support for this conclusion was provided by covariance analyses, which showed that measures of PTSD severity tended to covary with measures most strongly associated with the internalizing, rather than the externalizing, subtype.

The foregoing evidence suggests that the internalizing subtype may be the more "prototypic" of the two PTSD subtypes. This interpretation is consistent with the observation in both the current and previous studies that the internalizing group was the largest of the three clusters, with approximately 50% more cases assigned to this cluster than to the externalizing cluster in this study. It is also consistent with the fact that the predominant models of PTSD have emphasized the role of pathological anxiety in the disorder and that treatments for the disorder typically target the psychopathology of the internalizing subtype (i.e., the anxiety and depression-related symptoms).

Another important conceptual issue raised by the findings of this study involves the association between the dimensions of internalizing and externalizing and the relationship between our subgroups with respect to these dimensions. Internalizing and externalizing are moderately correlated, obliquely related latent factors of psy-

chopathology (Krueger et al., 1998), which have in common strong associations with negative emotionality (Krueger et al., 1996). The cluster analyses we used in this study partitioned the high-pathology cases into subgroups differing with regard to their propensities toward internalizing versus externalizing posttraumatic responses. Each subgroup included prototypical cases, defined by a predominance of one form of psychopathology or the other, and relatively undifferentiated cases that showed no such specification or fell at or near the boundary between clusters. Although the external correlates of the personality-based clusters (e.g., comorbid diagnoses and other clinically significant indicators) argue for their distinctiveness, understanding the undifferentiated cases at the cluster boundaries remains a challenge for future work. Given the absence of a predominance of internalizing/externalizing, variation in such boundary cases may be best represented along a dimension of PTSD severity or negative emotionality.

Study Limitations and Directions for Future Research

Etiological inferences about the extent to which these subtypes reflect the influence of premorbid personality are limited by the cross-sectional methods used. However, evidence for the longitudinal stability of personality traits in other research (e.g., Costa & McCrae, 1977, 1992; Watson & Walker, 1996) and indications of greater premilitary delinquency in the externalizing group in both of our studies (Miller et al., 2003) raise the possibility that these subtypes reflect the influence of premorbid traits on the expression of posttraumatic symptomatology. Future studies should examine this proposition with prospective longitudinal designs that incorporate the assessment of personality and psychopathology pre- and posttrauma exposure, and behavioral genetics designs that would permit examination of the degree of similarity among identical twins discordant for trauma exposure on measures of personality and psychiatric symptomatology (e.g., the Vietnam Era Twin Registry; Eisen, True, Goldberg, Henderson, & Robinette, 1987; Orr et al., 2003).

A second major limitation was that the sample was composed entirely of male Vietnam veterans with chronic PTSD, which raises questions as to whether similar cluster solutions would result from analyses of personality inventories obtained from other samples of individuals with PTSD, including mixed gender or female samples, or individuals with a less chronic form of the disorder. As noted previously (Miller et al., 2003), evidence from the child and adult psychopathology literatures suggests that there may be significant gender differences in the likelihood of developing internalizing versus externalizing disorders with males more likely to develop the latter (Kessler et al., 1997; Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993; Rende & Plomin, 1992), and recent research suggests that, whereas male adolescents exposed to trauma are more likely to exhibit externalizing symptoms, females are more likely to evidence internalizing ones (Kurz, Drescher, Klein, Gusman, & Schwartz, 2001; Schwab-Stone et al., 1999). Thus, one might expect to find less externalizing in female samples, mixed gender samples, or trauma samples of a different nature.

Other significant study limitations included the following: First, interrater reliabilities for SCID diagnoses and GAF ratings were moderate at best, a consideration that likely served to reduce the

probability of detecting cluster differences on these measures. Second, individual SCID items were not available for analysis thereby precluding analysis of continuous indices of comorbid psychopathology. Third, the Premilitary Delinquency Scale was developed for this study from existing items in a background and demographics questionnaire. Although the alpha coefficient was in an acceptable range, the validity of this scale has not yet been established. Fourth, revisions to the stressor criterion and the addition of the functional impairment criterion to the *DSM-IV* PTSD diagnosis complicates the generalization of findings from this *DSM-III-R* diagnosed sample.

In future research on PTSD subtypes, it may be useful to examine the full spectrum of Axis II disorders and their relation to internalizing and externalizing subtypes of PTSD. Given evidence for the covariation of negative emotionality, the Axis I anxiety and depressive disorders, and the Cluster C subgroup of personality disorders characterized in *DSM-IV* as "anxious-fearful" (Sander-son, Wetzler, Beck, & Betz, 1992, 1994; Zuckerman, 1999), one might expect internalizers to show higher rates of avoidant, dependent, or obsessive-compulsive personality disorder diagnoses. Likewise, externalizers who are defined by low Constraint coupled with high Negative Emotionality might be expected to exhibit higher rates of the Cluster B personality disorders (i.e., the "dramatic-emotional" disorders: antisocial, borderline, histrionic, narcissistic) characterized by impulsive/sensation-seeking behavior combined with labile emotionality. It would also be useful in future research to validate these clusters with additional quasi-criterion variables, of the type advocated by E. Robins and Guze (1970), including biological correlates. Along these lines, one might hypothesize, for example, that externalizers would be more likely to show abnormalities in the P300 event-related potential amplitude than would internalizers (Iacono, Malone, & McGue, 2003).

These findings suggest that a model of externalizing and internalizing psychopathology originally developed to account for covariation among broad classes of mental disorders (cf. Krueger et al., 1998, 2001) may be relevant to our understanding of the heterogeneity of psychopathology and comorbidity within PTSD as well. Moreover, the close correspondence between the PTSD subtypes identified in this work and three major personality "types" identified by developmental psychologists (i.e., resilient, overcontrolled, and undercontrolled; Asendorpf & van Aken, 1999; R. W. Robins, John, Caspi, Moffitt, & Stouthamer-Loeber, 1996; Hart, Hofman, Edelstein, & Keller, 1997) lends support to the validity of this typology and its relation to a fundamental structure of individual differences. We hope that the typology of PTSD suggested by this research will highlight links between the psychopathology of this disorder and research on the structure and organization of mental disorders more broadly, including their relations to personality. We also hope that this research will advance the understanding and conceptualization of—and enhance our ability to assess and treat—heterogeneous populations of trauma survivors.

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